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COAL-CUTTING MACHINES IN DEVELOPMENT WORK

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The first Soviet cutting machine for development work was the DL light bar percussion rotary cutting machine made by the Gorlovka Plant in 1932 - 1933. This machine was not widely accepted because of its low productivity. The next light cutting machine, the BSh type, was not widely used because it was underpowered, as was the next in line, the LVSh-2.

The first model of a heavy-duty universal cutting machine, the GVU (mounted on caterpillar tread), was developed by the Gorlovka Plant in 1939 and was tested in the Kuznetsk Basin in cutting drifts in the coal by complete cross section (po uglyu polnym secheniyem). After several changes in this model, an improved universal cutting machine, the VTU-1, successfully passed its tests in 1941. However, it was not put into production until after World War II. At present these machines are used in the Moscow, Kuznetsk, and other basins.

Besides the VTU-1 cutting machine which was designed for working coal by complete cross section, there are a few ShVD-46 longitudinal-bar (prodol'no-barovyy) machines, the full potentiality of which is not yet clear.

The ShVD-46 machine is designed for cutting coal in development work or stoping (room and pillar) in dipping seams over 0.85 meter thick which have a stable roof and a face from 3-4 to 15-20 meters long. This minimum seam thickness of 0.85 meter is determined by the height of the machine (nearly 670 millimeters) and the irregularity of the roof and floor at the face. In operation, this machine is set perpendicular to the face and, as it is 1.6 meters long, the track must be not less than 1.8 meters wide, a condition which is possible only with a stable roof.

Experiments at many mines (imeni OGPU, "Nezhdannaya," and others) showed that these machines were not suitable for development work at faces only 3-4 meters wide. Much time is consumed in operating the machine, thus complicating

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other work at the face and decreasing its effectiveness. In the US these machines are used quite extensively in development work in dipping (2-4 degrees) seams mined by the room and pillar system. This is possible because much development work in American seams is done in the room and pillar system without blasting. The faces are only 20-30 meters apart and the machines are transferred from face to face on self-propelled carriages, leaving the first face free for other operations. In the Donets and similar basins, the machine is only able to operate at one development face as the other faces are hundreds or even thousands of meters from the first, thus complicating other operations after each cutting. Therefore, the possibility of using machines in the Donbass and similar basins is exceedingly limited.

In the Moscow basin, where mining is done by complete or nearly complete cross section in coal, these machines cannot be used at all. The use of the VTU-1 machine, which is mounted on caterpillar tread, would be feasible, but it is too heavy, awkward, and overpowered (41.5 kilowatts).

A new machine of the BSh type with a power increase to 10-12 kilowatts and a strengthened bar and cutting chain might successfully replace the VTU-1 in medium-hard seams which are mined by complete or nearly complete cross section in coal, not only in the Moscow basin mines but in others also.

The main technical-operational requirements which such a machine must satisfy are:

1. The machine should be designed for cutting coal in drifts by complete or nearly complete cross section in coal of medium hardness.

2. It should be capable of making fan-shaped, vertical, inclined, and horizontal cuts and a low cut level with the floor of the drift.

3. It should be mounted on a carriage (preferably self-propelled) and be adaptable to rail transportation.

4. The carriage should have sturdy clamps of a collapsible type to reinforce it on the rails.

5. The cutting head with the bar should turn 360 degrees around its horizontal longitudinal axis. It should be made so that it can be turned easily by hand.

6. The cutting bar should be 2.2-2.4 meters long.

7. The machine should be less than 1,300 millimeters high and 850-900 millimeters wide for transporting purposes.

8. The motor should be remote controlled.

9. All electric parts of the machine should be insulated to prevent explosions.

10. The motor should have a capacity of 12-15 kilowatts.

Conclusions

1. The longitudinal-bar cutting machine cannot be used in development work when the operating width is narrow.

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2. The universal heavy-duty cutting machine (type VTU-1) is effective in development workings in mining by complete or nearly complete cross section when the operating width is narrow, but this machine is heavy and over-powered.

3. The mechanize cutting in faces of development workings it is necessary to develop a medium-power universal cutting machine which could be easily adapted to faces with a narrow operating width which are mined by complete (or nearly complete) cross section, in addition to the universal heavy-duty cutting machine now in operation.

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